

## AMENDMENT TO THE CLAIMS

1.(Original) A method of determining a heat treatment to apply to a structural member, so as to modify the deformation behaviour of the structural member when subjected to an applied stress, the method comprising:

simulating the deformation behaviour of the structural member when subjected to the applied stress;

simulating the effect of at least one heat treatment upon the at least part of the structural member so as to determine a heat treatment to apply to the at least part of the structural member, to produce the modified deformation behaviour.

2.(Original) A method according to claim 1, wherein the simulation of the deformation is performed using a numerical modelling method.

3.(Currently Amended) A method according to claim 1 ~~or claim 2~~, wherein the simulation of the heat treatment is performed using a numerical modelling method.

4.(Currently Amended) A method according to claim 2 ~~or claim 3~~, wherein the numerical modelling comprises a finite elements method.

5.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, wherein the heat treatment is simulated with a localised heat source.

6.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, wherein the heat treatment is simulated with a moveable heat source.

7.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, wherein the heat treatment is determined such that the simulated temperature generated in the structural member is less than the melting temperature for the material.

8.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, wherein each heat treatment is defined by a parameter and wherein a number of heat treatments are simulated by varying the parameter.

9.(Original) A method according to claim 8, wherein the heat treatment parameter describes one of the travel speed of the heat source, the heat input, the heat intensity distribution or the maximum temperature of the heat source.

10.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, wherein the heat treatment is determined automatically.

11.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, wherein the method further comprises selecting one or more regions forming part of the structural member in accordance with the simulated deformation.

12.(Original) A method according to claim 11, wherein each region is selected in accordance with a deformation property.

13.(Original) A method according to claim 12, wherein the deformation property is selected from a ductility, stress, strain, elongation or fracture property.

14.(Currently Amended) A method according to claim 12 ~~or claim 13~~ wherein each region is selected at a location in the structural member in accordance with a threshold in the deformation property.

15.(Currently Amended) A method according to ~~any of claims 12 to 14~~ claim 12, further comprising assigning a target threshold to the deformation property for each region.

16.(Original) A method according to claim 15, further comprising repeatedly:

simulating the deformation of the structural member having the assigned deformation property threshold in each region;  
comparing the simulated deformation with a desired behaviour; and,  
assigning a new target threshold and/or new region(s);  
until the desired deformation behaviour is simulated.

17.(Currently Amended) A method according to claim 15 or ~~claim 16~~, wherein the heat treatment is determined so as to produce a deformation behaviour meeting the target threshold in each region.

18.(Currently Amended) A method according to claim 17 further comprising repeatedly:

simulating the deformation of the structural member having the assigned deformation property threshold in each region;  
comparing the simulated deformation with a desired behaviour; and,  
assigning a new target threshold and/or new region(s);  
until the desired deformation behaviour is simulated, when dependent upon claim 16; wherein the deformation behaviour produced is the desired deformation behaviour.

19.(Currently Amended) A method according to ~~any of claims 11 to 18~~ claim 11, wherein the selection of each region is performed automatically.

20.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 11, further comprising simulating the deformation behaviour of the structural member in the heat treated condition.

21.(Currently Amended) A method according to claim 20 ~~when dependent upon claim 11~~, further comprising repeating the method to identify further regions for subsequent heat treatment.

22.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 1, further comprising applying the determined heat treatment(s) to a structural member workpiece.

23.(Original) A method according to claim 22, wherein the determined heat treatment(s) are applied using a localised controllable heat source.

24.(Original) A method according to claim 23, wherein the heat treatment(s) are applied using a laser or induction coils.

25.(Currently Amended) A method according to ~~any of claims 22 to 24~~ claim 22, further comprising monitoring a received structural member workpiece so as to generate monitored data, wherein the simulation of the deformation behaviour is performed using the monitored data.

26.(Original) A method according to claim 25, wherein the heat treatment for each region is selected from a group of predetermined heat treatments for the structural member.

27.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 25, wherein the structural member includes at least two substructural members welded together.

28.(Currently Amended) A method according to ~~any of the preceding claims~~ claim 25, wherein the structural member is a vehicle impact member.

29.(Currently Amended) A computer program comprising computer program code means adapted to perform the method according to ~~any of the preceding claims~~ claim 1.

30.(Original) A computer program according to claim 29, embodied on a computer readable medium.

31.(Original) An impact protection member comprising at least one localised heat treated region, each of the at least one region being generated by the application of a heat treatment to a localised region of the impact protection member, wherein each heat treated region is arranged to modify the deformation behaviour of the impact protection member when the member is subjected to an applied stress.

32.(Original) An impact protection member according to claim 31, wherein each region is generated by the application of a heat treatment to a surface of the member, said surface being defined by first and second axes, wherein each heat treated region is localised with respect to the said surface such that each region extends along only part of the surface with respect to each of the first and second axes.

33. (Currently Amended) An impact protection member according to claim 31 or 32, wherein the heat treated region is localised such that, during application of the heat treatment, thermal gradients are formed in the member along each of the first and second axes defining the surface throughout the duration of the heat treatment.

34.(Currently Amended) An impact protection member according to ~~any of claims 31 to 33~~ claim 31, wherein each of the dimensions of each region are small with respect to the corresponding dimensions of the surface.

35.(Currently Amended) An impact protection member according to ~~any of claims 31 to 34~~ claim 31, wherein each region is positioned upon the surface such that it is substantially enclosed within the boundary of the surface.

36.(Currently Amended) An impact protection member according to ~~any of claims 31 to 35~~ claim 31, wherein the impact protection member comprises a plurality of discrete localised heat treated regions.

37.(Original) An impact protection member according to claim 36, wherein at least one heat treated region is provided upon each of a plurality of surfaces of the impact protection member.

38. (Currently Amended) An impact protection member according to ~~any of claims 31 to 37~~ claim 31, wherein the impact protection member is a vehicle crash box.

39.(Currently Amended) An impact protection member according to ~~any of claims 31 to 38~~ claim 31, wherein for each region, the thickness of the member material in a direction normal to the surface and the corresponding heat treatment are arranged such that a substantially similar heat treatment is provided at each point through the thickness of the material in the direction normal to the surface.

40.(Currently Amended) An impact protection member according to ~~any of claims 31 to 39~~ claim 31, fabricated from an aluminium alloy.

41.(Currently Amended) An impact protection member according to ~~any of claims 31 to 40~~ claim 31, wherein the modified deformation behaviour comprises an increased energy absorption during deformation or a reduction in the applied stress at which the impact protection member initially deforms plastically.

42.(Currently Amended) An impact protection member according to ~~any of claims 31 to 41~~ ~~claim 31~~, wherein each heat treatment is determined according to a method comprising: of ~~any of claims 1 to 28.~~

simulating the deformation behaviour of the structural member when subjected to the applied stress;

simulating the effect of at least one heat treatment upon the at least part of the structural member so as to determine a heat treatment to apply to the at least part of the structural member, to produce the modified deformation behaviour.